
PROTOCOL

Addressing the Combined Surficial Risks from Adjacent Units

Introduction

This protocol has been developed in order to support the Savannah River Site environmental remediation program. It provides guidance on the establishment of Exposure Units and a methodology for addressing the combined surficial risks from Subunits within an Exposure Unit in support of an Area Completion strategy. A Subunit is an individual Federal Facility Agreement (FFA) waste unit or a facility (remnant) remaining after decommissioning. An Exposure Unit is a grouping of Subunits based on the areal extent of a receptor's movements during a defined time period. The protocol instructions are based on the latest available USEPA guidance and agreement from the staff of USEPA, SCDHEC, and USDOE as members of the Risk Assessment Design Team (RADT).

Exposure Unit Determination

Exposure Units should be determined by the Area Project Core Team (APCT) during project scoping following a review of existing data and site specific information. In the absence of an industry standard on the anticipated range for a future industrial worker, the Exposure Unit area designation is determined on a site-specific basis by the APCT.

Based on an assumed range for a future industrial worker in an Area Operable Unit (OU) setting, the typical size of an Exposure Unit is 1 to 5 acres. However, exceptions may include larger, homogeneous waste sites, or smaller, geographically isolated waste sites as determined by the APCT. When defining the Exposure Unit boundaries, the first exposure area designation should be based on a reasonable maximum exposure (RME) scenario (worst case) to minimize underestimating the risk over a larger area. Existing features such as roads, fences, or other natural breaks/features may also be considerations in defining the boundary. The Exposure Unit's unavailability to potential receptors needs to be taken into consideration when defining the physical dimensions of each Exposure Unit. If the pathways for exposure are incomplete due to greater restrictions (e.g., physical barriers and institutional controls), then that should be identified as such on the Conceptual Site Model and not be included in the Exposure Unit area designation. Ultimately, the Exposure Unit designation should be determined by the APCT based upon project specific considerations.

Each Subunit must be accounted for in an Exposure Unit. Subunits should not be divided between Exposure Units. A remedial decision will be made for each Exposure Unit and could address multiple Exposure Units in an Area OU setting.

Exposure Unit Risk Evaluation Methodology

Typically, human health risk in the Soil and Groundwater Closure Projects (SGCP) program is evaluated on a Subunit-by-Subunit basis; this approach may also be appropriate in some cases for an Area Operable Unit evaluation (e.g., a release site or waste unit that is geographically isolated from the rest of the area). Additionally, a receptor specific exposure area approach which combines the risk of individual Subunits within an Exposure Unit may be more efficient for data collection and remedial decisions.

In addition to the individual Subunit risk evaluation, the Exposure Unit risk is determined using an area-weighted approach. The area of each Subunit is weighted against the total Exposure Unit area to estimate the risk contribution of each subunit to the Exposure Unit. The Exposure Unit risk estimate is determined by considering the area-weighted Subunit risks. In this way, the total risk for a receptor (i.e., future industrial worker) would be "proportionalized" based on the area of each of the Subunits.

Details

1. A risk assessment should be performed for each Subunit (waste units/facilities) within an Area Operable Unit. Calculation of the risk estimate for each Subunit will be in accordance with SGCP protocols (Human Health Constituent of Concern Protocol). Refined COCs (RCOCs) should be identified in accordance with the Refinement of Constituents of Concern protocol.
2. For each Subunit, the risk will be considered in the Exposure Unit risk evaluation if there are RCOCs identified.
3. The Exposure Unit risk is calculated by using an area-weighted approach. This approach considers the range of the receptor (industrial worker) and the amount of time that he would theoretically spend at each of the Subunits. The formula for calculating the Exposure Unit risk estimate is provided below:

Exposure Unit risk estimate = Sum of [(risk for Subunit) x (area of Subunit / area of the Exposure Unit)]

Example Calculation for Exposure Unit*Summary of Risk Estimate and Area of Each Subunit in Exposure Unit*

Subunit	Risk Estimate	Area
FFA Waste Unit A	2.0E-05	2.5 acre
FFA Waste Unit B	Site Evaluation NFA	0.3 acre
FFA Waste Unit C	No RCOCs (i.e., <1E-06)	0.2 acre
D&D Building Slab D	8.0E-06	1.0 acre
D&D Building Slab E	Simple Model ¹	0.1 acre
Space not occupied by subunits		0.9 acre
Total Area of Exposure Unit =		5 acres

1. The term "Simple Model" is part of the graded approach implemented by Site D&D that is based on the hazards commensurate with the unit's relative importance to safety and degree of complexity. Simple model facilities are assumed to have <1E-06 risk for a future industrial worker (i.e. negligible chemical or radiological risk) and will not be included in the Area Operable Unit or subsequent area evaluations (in accordance with FFA Section XL).

In this example, only 2 subunits area determined to contribute to the overall Exposure Unit risk.

Risk Estimate Using an Area-Weighted Approach

Subunit ¹	Risk Estimate ²	Weighted Area ³	Area-Weighted Risk Estimate ⁴
Waste Unit A	2.0E-05	2.5 acre/ 5 acre = 0.5	1.0E-05
Building Slab D	8.0E-06	1 acre/ 5 acre = 0.2	1.6E-06
Exposure Unit Risk⁵ =			1.2E-05

1. Only those subunits with RCOCs identified are considered in the Exposure Unit risk estimate.
2. Risk estimate = result of risk evaluation using SGCP protocols.
3. Weighted area = area of the Subunit/area of the Exposure Unit
4. Area-weighted risk estimate = risk estimate x weighted area
5. Exposure Unit risk = sum of the weighted area risks of each of the Subunits